The Internal Heat of the Earth

ON looking over the account, contained in vol. xii. p. 545, of Prof. Mohr's interesting observations on the internal heat of the earth, I found that, according to the law which seems to prevail between the depths of 700 and 3,390 feet, there will cease to be any increase at all in the temperature exactly at the depth of one English mile, or 5,280 feet.

The reason of the discrepancy between this result and that previously given, is to be found in the last entry in your table, where only the upper part of the stratum between the depths of 3,300 and 3,500 feet, is taken, instead of the whole 200 feet, as in the other strata.

The following continuation of the table will make this evident :—

Depth.	Increase per 100 feet.
3300 to 3500 feet	0·445° R.
3500 „ 3700 „	0·395 „
3700 „ 3900 „	0·345 „
3900 „ 4100 „	0·295 „
4100 „ 4300 „	0·245 „
4300 „ 4500 „	0·195 „
4500 „ 4700 „	0·145 „
4700 „ 4900 „	0·095 „
4900 „ 5100 „	0·045 „
5100 „ 5280 „	0° „

By adding the various increments of temperature below the depth of 3,390 feet to the temperature there observed of 36·756° R., we obtain 40·81° R., or 123·82° F. as the maximum temperature.

To temperature at		
3390 feet	=	36·756° R.
Add at 3400 „		·044 „
„ 3500 „		·445 „
„ 3700 „		·790 „
„ 3900 „		·690 „
„ 4100 „		·590 „
„ 4300 „		·490 „
„ 4500 „		·390 „
„ 4700 „		·290 „
„ 4900 „		·190 „
„ 5100 „		·090 „
Between 5100 and 5280		·045 „
		40·810

There is a further remark called for by the manner of filling up the gap above 700 feet. If we compare the increment given for the stratum between 600 and 700 feet, namely 1·10, with that of the next stratum, namely, 1·097, we get a difference of only 0·003 instead of 0·05, as in all other parts of the table. It would be more in accordance with the lower part of the table if we could proceed thus :—

Depth.	Increase per 100 feet.
Above 100 feet	1·30°
100 to 300 „	1·25
300 „ 500 „	1·20
500 „ 700 „	1·15
700 „ 900 „	1·097 = 1·10 nearly.

Whether the facts observed will warrant such an extension of the table is a question into which I forbear to enter.

Bradford, Oct. 27 JOHN WILLIS

OUR ASTRONOMICAL COLUMN

40 ERIDANI.—Prof. Winnecke measured, in addition to the well-known distant companion of this star, which is affected with nearly the same large proper motion, two small stars which he calls D and E. It would be interesting to ascertain if these stars are fixed, or if they also follow the principal one in its rapid motion through space, and measures taken during the present season may be expected to decide the point.

The results obtained in 1864 are :—

A D	1864·842	Position	185°·04	Distance	75″·85
A E	„	„	312·48	„	89·45

If we adopt Mädler's proper motions for 40 Eridani, from the Dorpat Observations vol. xiv., or −2″·188 in R.A. and −3″·470 in declination, we find for 1875, Nov. 15, if D and E are fixed—

A D	..	Position	155°·2	... Distance	41″·1
A E	...	„	336·9	... „	107·3

Sir John Herschel had probably in view the physical connection of D and E with their bright neighbour when he suggested that at least a diagram of the relative situation of the small stars near it should be made.

The *comes* B which partakes of the large proper motion of A is itself a close double-star, II. 80 of Sir W. Herschel and Σ 518, and Struve first notified its probable binary nature. Dawes refers to the difficulty attending measures in 1851, but the list of epochs is decisive as to rapid orbital motion. We have for comparison—

Herschel	1783·08	Position	326°·7	Distance	4″—8″
Struve	1825·12	„	287·7	„	...
O. Struve	1850·94	„	160·2	„	3·93
Dawes	1851·06	„	160·0	„	3 ±
O. Struve	1851·50	„	160·2	„	3·85
Winnecke	1864·85	„	147·6	„	4·46

Dawes estimated the magnitudes of the components 10½ and 11, but there is a suspicion of variability of the smaller one.

PROPER MOTION OF α^2 CENTAURI.—The values given in our catalogues for the proper motion of this star in declination are not so accordant as might be expected if only the more reliable or modern observations are used. Thus the Cape General Catalogue has + 0″·83, the Melbourne General Catalogue + 0″·49.

Perhaps as reliable a figure as any that can be derived from data so far published will be obtained by comparing the declination of the Melbourne Catalogue with that given by the Astronomer Royal's reduction of the observations of the Rev. Fearon Fallows at the Royal Observatory, Cape of Good Hope, 1829-31. With Prof. Peters' elements for precession, this comparison gives + 0″·4399. If we similarly compare with Johnson's observations at St. Helena, we find + 0″·4867. Probably La Caille's declination has been used in working up the adopted Cape value, as on comparing it with the Melbourne declination for 1870, we should have for the proper motion, + 0″·723.

For proper motion in right ascension, the comparison of Fallows and Melbourne General Catalogue gives −0·5235s., and the substitution of Johnson for Fallows alters this to −0·5462s.

THE "ASTRONOMISCHE NACHRICHTEN."—A General Register of the contents of this publication, so indispensable to every practical astronomer, from vols. lxi. to lxxx., by Dr. C. F. W. Peters, is announced (Mauke, Leipsic).

The last number contains the Washington observations of the satellites of Uranus and Neptune during the first five months of the present year, with numerous measures of the position of the companion of Sirius in the years 1873-75 ; also, remarks by Prof. Asaph Hall on the determination of the mass of Mars from perturbations of the minor planets, in which Massalia, Echo, Beatrix, and Peitho are mentioned as the planets best adapted for this purpose. Magnifying powers of 610 and 890 were generally used for the satellite-observations, but on a few occasions one of 1,290 was employed ; the companion of Sirius was generally measured with 400, all the observations being taken with illuminated wires in a dark field.—The death of Dr. August Reslhuber, so long director of the Observatory at Kremsmünster, is announced.

A NEW PALMISTRY

DR. ALEXANDER ECKER, the well-known authority on matters prehistorical, as well as Professor of Comparative Anatomy in Freiburg, Baden, contributes to

a recent number of the periodical, of which he is a joint editor, a most suggestive paper, entitled "Some Remarks upon a Fluctuating Character in the Human Hand."* As the line of research is somewhat uncommon, and may, for aught we know, be productive of important results, the substance of Prof. Ecker's paper is here presented to English readers in an abridged form.

Henle, in his work on Anatomy, has made the observation that people have very vague ideas about objects even which are assumed to be well known; *e.g.* the query is often put, How many feet has a crab? or, How many toes has a cat?—questions which receive most varying answers even in well-informed and educated circles.

If, then, the question be put in the company of half a dozen people, which finger is the longest—the index (forefinger) or the "ring" (fourth) finger?—the query can but seldom be answered before the members in question have been looked at. It seems, further, very probable that the authors of well-known anatomical works have laid down as being the rule that which they have observed on their own hands, so that we are enabled to tell in what respect, as to digital arrangement, such and such *savant* is endowed. For instance—Weber says that the "ring" finger is only slightly shorter than the index; Carus holds that the latter digit is shorter than the ring finger; Henle is of the same opinion; while, according to Hyrtl, it is the index which comes next to the middle finger (the longest) in length; and Langer, lastly, says that the index is generally shorter than the "ring" finger, but that there are individuals in whom they are nearly of the same length.

Have these variations a morphological significance or not? For the solution of this, answers to the following questions are necessary:—

(*a*) How are the animals which come next after man, in other words, the apes, and especially the anthropomorphous apes,† off in this particular?

(*β*) What is the case with the lower races of mankind in the same particular?

(*γ*) What is the most usual digital arrangement in this respect among the European races of man? and lastly,

(*δ*) Which proportion of the two digits in question has been accepted as the most beautiful and symmetrical, and either knowingly or unknowingly adopted in art?

1. With regard to the Ape, the index is—and often considerably—shorter than the "ring" finger. The difference in length is much more considerable in the Chimpanzee than in the Gorilla; the greatest difference, that of 20 mm., having been found in the cast of a hand of a male Chimpanzee.

2. Drawings—made by placing the hand upon paper, the axis of the middle digit coinciding with a straight line at right angles to the front or hind margin of the paper, supposing the latter to be a parallelogram, and then following the outline of the fingers with a pencil—were made of twenty-five male and twenty-four female negroes, with the following result:—

(*a*) Among the males twenty-four had the "ring" finger longest, the average difference being 8 mm., while in the remaining instance both fingers were of the same length.

(*b*) Out of the females the "ring" finger was longest in fifteen, the difference varying from 2 to 14 mm.; in three the fingers were of the same length; while in six the index was the longer, the difference being from 2 to 6 mm.

Prof. Ecker has further found the "ring" finger longest in casts and in several photographs of the hands of negroes; but in the hand of a "Turco" negro the index was the longer of the two digits. In photographs of a Hottentot and of an Australian female, the "ring" finger was the longer, while in a photograph of a female Sandwich Islander the reverse was the case.

3. As for Europeans, no conclusions have as yet been arrived at; but it appears probable that there is a relatively greater length of the index finger in the female than in the male sex; and further, among the latter, in the slight and highly developed, than in the short and underset.

4. Lastly, as regards Art. In that which is left to us of the productions of the ancients, there are variations in the relative length of the two digits, though it appears that the index finger, and especially so in the female, ought to be the longest. In the Dying Gladiator the index (of the left hand supported upon the knee) is the longer; while in the Apollo "Belvedere" (right hand) there is no appreciable difference. In the Venus "Medici,"* in the Venus "pudica" of the Gallérie Chiaramonti, in Rome, as well as in the Venus by Praxiteles, in the Vatican, the index is obviously the longest. In modern art there seems to be no evidence of rule or canon; among painters, for instance, there being, it appears, no fixed tradition on this point. In Schadow's "Polyklet, oder von den Maassen des Menschen nach dem Geschlecht und Alter" (2te Aufl. Fol., Berlin, 1867) no rule is laid down. In the extended hand of a powerful man, by Albrecht Dürer, the "ring" finger is the longest.

It is not probable that a difference in the length of the fingers in question is a merely individual, so-called chance (zufällige) variation, for the reason that the whole form of the hand is in relation with this. In the variety of hand termed *elementary*, by Carus ("Ueber Grund und Bedeutung der verschiedenen Formen der Hände in verschiedenen Personen;" 4to., Stuttgart, 1846), the index is shortest; in the *motor* variety the difference is not considerable, the index being slightly the longer; in the *sensible* form the index is longer, but not much so; while in the *intellectual* (seelische) this finger is considerably the longer. The opinion just given is further supported by the fact that in the Mammalia the length of the various digits is very constant.

It may be concluded, then, that—

α. In the Apes as yet examined, the difference being least marked in the Gorilla, the index finger is the shorter.

β. In Negroes, also, the index appears to be the shorter. No sexual difference can as yet be established.

γ. In Europeans the variation is so great that at present no rule can be laid down.

δ. When a great artist has attempted to represent a beautiful and ideally perfect hand, he has never made the index strikingly shorter than the "ring" finger.

May it then not be possible,—

1. That an index relatively longer than the "ring" finger is the attribute of a higher form of beauty?†

2. That here, as in many other particulars, the female form appears to be morphologically the purest?

The longest and least mobile finger is the middle one; the shortest, and most capable of motion, is the thumb, or "pollex;" next in order in the scale of mobility come the little, "ring," and lastly the index, or forefinger.

The question which Prof. Ecker has here raised, and into which he intends to inquire further, may appear to some trivial and unworthy of serious study; but, far from this, the satisfactory solution of it will, there is but little doubt, be of the greatest interest not only to the philosophical anatomist, but also to the sculptor and painter who would fain go a little below the mere surface of his art. It is certainly a subject in which, were they yet alive, such men as Goethe and Winkelmann would take the deepest interest.

JOHN C. GALTON

* "Einige Bemerkungen über einen schwankenden Character in der Hand des Menschen." *Archiv für Anthropologie*, viiiᵉʳ Bd. s. 67.

† Such as the Orang, Gorilla, Chimpanzee, and Gibbons.

* The famous Medician Venus has been said to be a copy by Cleomenes, a son of Apollodorus, of the Venus of Cnidos, by Praxiteles. *Vide* Winckelmann's "Geschichte der Kunst des Alterthums."—J. C. G.

† The hands of the writer are, unfortunately, specimens of the lower type, each index being considerably shorter than the "ring" finger in the same series. It is a curious fact that in each hand the radial artery at its termination, instead of plunging beneath the volar muscles, takes a superficial and somewhat dangerous course as far as the skin web which passes from the pollex to the index. It would be interesting to know whether these phenomena are correlative or not.